What is claimed is:

1. A concentrated-winding type stator coil unit for a rotary electric machine, comprising:

a stator core having a core back and teeth protruding from the core back; and

a plurality of coils wound around the teeth respectively, each of the coils being composed of a plurality of layered coils consisting of one or more pairs of layered coils consisting of a first layered coil formed by winding an insulation-coated coil wire in a layer around each of the teeth to form a plurality of turns arranged on each tooth and a second layered coil formed by winding the coil wire in a layer to form a plurality of turns arranged on each of the first layered coils wound around the teeth respectively,

wherein the coil wire is wound to allow a last turn of the first layered coil to continue to a first turn of the second layered coil and both ends of the coil wire are located at and on a base potion of each of the teeth so that both ends serve as a winding-start end and a winding-finish end of each of the coils.

2. The stator coil unit according to claim 1, wherein both the winding-start end and a winding-finish end are drawn out from both the first and second layered coils along the core back as a pair of leading ends of each of the teeth.

3. The stator coil unit according to claim 2, wherein both of the winding-start end and a winding-finish end are placed separately at both ends of the base portion of each of the teeth in a circumferential direction of the stator core.

4. The stator coil unit according to claim 3, wherein both the leading ends are drawn out directly toward the core back with the separation therebetween kept, whereby the both the leading ends are located on the same side of the core back in an axial direction of the stator core.

5. The stator coil unit according to claim 1, wherein the first layered coil is composed of plural turns including the last turn, the plural turns of the first layered coil being wound in turn along a direction from the base portion of each of the teeth to a tip portion thereof and the second layered coil is composed of plural turns including the first turn, the plural turns of the second layered coil being wound in turn along a direction from the tip portion to the base portion.

6. The stator coil unit according to claim 1, wherein the first turn of the second layered coil has a coil-bent portion bent toward a tip portion of each of the teeth,

a second turn of the second layered coil has another coil-bent portion first bent toward the base portion of each of the teeth and then bent toward the tip portion thereof so that the second turn is juxtaposed to the first turn in a radial direction of the stator core, and

one or more other remaining turns of the second layered coil, which continues in turn to the second turn, each has another coil-bent portion first bent toward the base portion of each of the teeth and then bent toward the tip portion thereof so that the remaining turns are juxtaposed in sequence to the second turn in the radial direction of the stator core.

7. The stator coil unit according to claim 6, wherein the coil-bent portions of the turns of the second layered coil are arranged over one side of each of the tooth in the axial direction of the stator core, the one side being the same as the side of the core back on which both the leading ends are located.

8. The stator coil unit according to claim 1, wherein the first turn of the second layered coil has a coil-bent portion bent toward a tip portion of each of the teeth.

9. The stator coil unit according to claim 8, wherein the coil-bent portion of the first turn of the second layered coil is arranged over one side of each of the tooth in the axial direction of the stator core, the one side being the same as the side of the core back on which both

the leading ends are located.

10. The stator coil unit according to claim 1, comprising bus bars serving as at least one of tooth-to-tooth crossover lines, a neutral-point line, and phase terminals and being disposed in proximity to an axial surface of the core back, the axial surface being the same as the side of the core back on which both the leading ends are located.

11. The stator coil unit according to claim 10, wherein the bus bars consist of different phase bus bars located differently in the axial direction of the stator core, the crossover lines for the same phase being located in the same position in the axial direction of the stator core, and

wherein both the leading ends of each of the coils are joined with the bus bars.

12. The stator coil unit according to claim 11, comprising a bus-bar holder being attached to the axial surface of the core back and having a plurality of grooves being oriented, after the attachment, along the circumferential direction of the stator core and being opened outward in a radial direction of the stator core,

wherein the bus bars are accommodated phase by phase in the grooves.

13. The stator coil unit according to claim 12, wherein a specified one of the grooves houses a neutral-point bus bar connected to three-phase windings realized as a whole by the coils wound around each of the teeth.

14. A method of winding a coil wire around each of teeth protruding from a core back of a stator core incorporated in a concentrated-winding type stator coil unit for a rotary electric machine, the method comprising the steps of:

locating a one end of the coil wire along a single side surface of a base portion of each of the tooth with a first predetermined end portion of the one end drawn out toward the core back as a first leading end, the single side surface facing an axial direction of the stator core;

first winding the core wire on and around each of the teeth to form a plurality of turns extending as a first layered coil from the base of each tooth to a tip portion thereof, a last turn being wound to reach a position on each tooth at which the side surface begins;

second winding the coil wire on and around the first layered coil wound on and around each tooth to form a plurality of turns extending as the second layered coil from the tip portion of each tooth to the base portion, the first turn of the second layered coil being continued from the last turn of the first layered coil, the second forming step including a sub-step of forming and winding a transit coil portion serving as both part of the last turn of the first layered coil and part of the first turn of a second layered coil wound around the first layered coil, the transit coil portion being bent to run a different path at least partially shifted toward the tip of each tooth; and

locating a remaining end of the coil wire along the single side surface of the base portion of each of the tooth with a second predetermined end portion of the remaining end drawn out toward the core back as a second leading end.

15. The method of winding the coil wire according to claim 14, wherein both the leading ends are drawn out directly toward the core back with a separation therebetween kept, whereby the both the leading ends are located on the same side surface of the core back in the axial direction of the stator core.

16. A method of winding a coil wire around each of teeth protruding from a core back of a stator core incorporated in a concentrated-winding type stator coil unit for a rotary electric machine, the method comprising the steps of:

locating a one end of the coil wire along a single side surface of a base portion of each of the tooth with a first predetermined end portion of the one end drawn out toward the core back as a first leading end, the single side surface facing an axial direction of the stator core;

first winding the core wire on and around each of the teeth to form a plurality of turns extending as a first layered coil from the base of each tooth to a tip portion thereof, a last turn being wound to reach a

position on each tooth at which the side surface begins;

second winding the coil wire on and around the first layered coil wound on and around each tooth to form a plurality of turns extending as the second layered coil from the tip portion of each tooth to the base portion, the first turn of the second layered coil being continued from the last turn of the first layered coil;

locating a remaining end of the coil wire along the single side surface of the base portion of each of the tooth with a second predetermined end portion of the remaining end drawn out toward the core back as a second leading end; and

forming a transit coil portion serving as both part of the last turn of the first layered coil and part of the first turn of the second layered coil, the transit coil portion being bent to run a different path shifted toward the tip of each tooth.